



International Journal of Veterinary Sciences and Animal Husbandry



ISSN: 2456-2912

NAAS Rating (2026): 4.61

VET 2026; 11(8): 170-172

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www.veterinarypaper.com

Received: 14-06-2026

Accepted: 18-07-2026

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Economic evaluation of peppermint (*Mentha piperita* L.) leaves powder supplementation in Sonali poultry birds

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DOI: <https://www.doi.org/10.22271/veterinary.2026.v11.i8c.3726>

Abstract

The present investigation was undertaken to evaluate the economic efficiency of peppermint (*Mentha piperita* L.) leaves powder supplementation in Sonali poultry birds. The experiment was conducted during 2025–2026 at the Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur, Maharashtra. A total of 120 Sonali day-old chicks were randomly distributed into four dietary treatments, with three replications of 10 birds each, under a completely randomized design. The experimental treatments consisted of T₁: basal diet without peppermint leaves powder, T₂: basal diet + 0.3% peppermint leaves powder, T₃: basal diet + 0.5% peppermint leaves powder and T₄: basal diet + 0.7% peppermint leaves powder. The experimental period was 56 days. Economic efficiency was evaluated based on the cost of day-old chicks, feed cost, peppermint leaves powder cost, rearing cost, total cost of production, gross return, net profit and benefit:cost ratio. The total cost of production was ₹146.20, ₹148.98, ₹153.84 and ₹152.88 per bird in T₁, T₂, T₃ and T₄, respectively. The corresponding gross returns were ₹252.60, ₹258.60, ₹278.40 and ₹267.60 per bird. Net profit was ₹106.40, ₹109.62, ₹124.56 and ₹114.72 per bird, respectively. The benefit:cost ratios were 1.73, 1.74, 1.81 and 1.75, respectively. The highest net profit and benefit:cost ratio were recorded in T₃, supplemented with 0.5% peppermint leaves powder. Although T₃ incurred the highest production cost, the higher return associated with its final live body weight resulted in the greatest economic advantage. Under the input costs and live-bird price prevailing during the study, supplementation of peppermint leaves powder at 0.5% appeared to be the most economically promising level for Sonali poultry birds.

Keywords: Economics, peppermint, *Mentha piperita*, Sonali poultry, net profit, benefit:cost ratio, phytogetic feed additive.

1. Introduction

Poultry production is an important component of livestock production and contributes to the availability of animal protein and income generation. Profitability in poultry farming depends largely on efficient utilization of feed and other production inputs. Therefore, reducing unnecessary expenditure while maintaining satisfactory productive performance is essential for improving the economic efficiency of poultry production.

Feed represents one of the major variable costs in poultry production. Consequently, nutritional interventions that improve productive performance without causing excessive additional expenditure may contribute to better profitability. In recent years, considerable attention has been directed towards phytogetic feed additives derived from medicinal and aromatic plants as potential natural feed additives in poultry diets.

Peppermint (*Mentha piperita* L.) is an aromatic plant containing biologically active constituents, including essential oils and menthol. Its use as a dietary supplement has been investigated in poultry because of its potential effects on productive performance and feed utilization. Asadi *et al.* (2017) ^[2] reported that peppermint powder supplementation influenced productive performance and feed conversion in broiler chickens. Abdel-Wareth *et al.* (2019) ^[1]

evaluated peppermint leaves and their active component in broiler diets and reported effects on productive performance and economic characteristics. Khurshid *et al.* (2016) ^[4] also investigated mint leaves as herbal dietary supplement and evaluated their effects on the performance and economics of broiler production.

Sonali poultry birds are commonly reared for meat production and are appreciated for their adaptability and productive characteristics. However, information on the use of peppermint leaves powder in Sonali poultry diets is limited. Hence, the present investigation was undertaken to evaluate the economics of production under different levels of dietary peppermint (*Mentha piperita* L.) leaves powder supplementation."

2. Materials and Methods

2.1 Experimental site

The experiment was conducted at the Section of Animal Husbandry and Dairy Science, College of Agriculture, Nagpur, Maharashtra, during 2025–2026.

2.2 Experimental birds and design

A total of 120 Sonali day-old chicks were procured from Dhanraj Poultry Farm, Dhantoli, Nagpur. The birds were randomly distributed into four dietary treatments, each consisting of three replications with 10 birds per replication. The experiment was conducted for 56 days under a completely randomized design.

2.3 Dietary Treatments

Table 1: Details of Dietary Treatments and Feeding

Treatment	Experimental Diet	Number of Birds
T ₁	Basal diet (Control)	30
T ₂	Basal diet + 0.3% peppermint leaves powder	30
T ₃	Basal diet + 0.5% peppermint leaves powder	30
T ₄	Basal diet + 0.7% peppermint leaves powder	30
	Total	120

2.4 Preparation of peppermint leaves powder

Peppermint leaves were collected, cleaned, dried under suitable conditions and ground to obtain leaves powder. The prepared powder was incorporated into the respective experimental diets at the specified inclusion levels.

2.5 Management of experimental birds

The birds were reared under a deep-litter system in a well-ventilated poultry house. Standard management, feeding, watering and health-care practices were followed throughout the experimental period.

2.6 Economic analysis

The economics of production was calculated by considering the cost of day-old chicks, feed, peppermint leaves powder and rearing.

The following formulae were used:

Total cost of production (₹/bird)

= Cost of day-old chick + Cost of feed and peppermint leaves powder + Rearing cost

Gross return (₹/bird)

= Final live body weight (kg) × prevailing live-bird price (₹/kg)

Net profit (₹/bird) = Gross return – Total cost of production

Benefit:cost ratio = Gross return ÷ Total cost of production

3. Results and Discussion

3.1 Cost of feed consumption

The feed consumption per bird was 2.32, 2.34, 2.43 and 2.37 kg in T₁, T₂, T₃ and T₄, respectively. At a feed cost of ₹37.50/kg, the corresponding feed costs were ₹87.00, ₹87.75, ₹91.12 and ₹88.87 per bird.

The highest feed expenditure was therefore recorded in T₃. This was associated with its comparatively higher feed consumption.

3.2 Cost of peppermint leaves powder

Peppermint leaves powder consumption was 0, 7.02, 12.15 and 16.59 g per bird in T₁, T₂, T₃ and T₄, respectively.

At ₹290/kg, the corresponding expenditure on peppermint leaves powder was ₹0.00, ₹2.03, ₹3.52 and ₹4.81 per bird.

As expected, the cost of peppermint supplementation increased with increasing inclusion level. Thus, the additional cost associated with peppermint supplementation was lowest in T₂ and highest in T₄.

3.3 Total cost of production

Table 2: Economics of Sonali poultry production under different levels of peppermint leaves powder supplementation

Sr. No.	Particulars	T ₁	T ₂	T ₃	T ₄
1.	Cost of day-old chicks (Rs)	25	25	25	25
2.	Cost of feed (Rs/kg) or 1875 (Rs)/50kg/bag	37.50	37.50	37.50	37.50
3.	Total feed consumption per bird (kg)	2.32	2.34	2.43	2.37
4.	Cost of feed consumption per bird (Rs/bird)	87.00	87.75	91.12	88.87
5.	Total Peppermint leaves powder consumption per bird (g)	00	7.02	12.15	16.59
6.	Cost of Peppermint leaves powder @ RS 290/kg	00	2.03	3.52	4.81
7.	Total cost of consumption (feed + peppermint leaves powder) per bird (Rs) (4+6)	87.00	89.78	94.64	93.68
8.	Rearing cost per bird (Rs) (Medicine, litter, electricity and labour etc.)	34.20	34.20	34.20	34.20
9.	Total cost of production (Rs) (1+7+8)	146.20	148.98	153.84	152.88
10.	Average Body weight at the end of 8 th week per bird (kg)	0.842	0.862	0.928	0.892
11.	Average price realized @ Rs 300 per kg weight (Rs)	252.60	258.60	278.40	267.60
12.	Net profit per bird (Rs) (11-9)	106.40	109.62	124.56	114.72
13.	Benefit cost ratio (B: C Ratio)	1.73	1.74	1.81	1.75

The total cost of production was ₹146.20, ₹148.98, ₹153.84 and ₹152.88 per bird in T₁, T₂, T₃ and T₄, respectively.

The highest total production cost was observed in T₃, followed by T₄, T₂ and T₁. The increased cost in peppermint-supplemented groups was mainly due to the additional cost of peppermint powder and differences in feed consumption.

3.4 Gross return

The final live body weights considered for economic calculation were 0.842, 0.862, 0.928 and 0.892 kg per bird in T₁, T₂, T₃ and T₄, respectively.

At a live-bird price of ₹300/kg, the gross returns were ₹252.60, ₹258.60, ₹278.40 and ₹267.60 per bird, respectively. The higher gross return in T₃ was primarily associated with its higher final live body weight.

3.5 Net profit

Net profit is a particularly important indicator for evaluating the practical economic value of a dietary treatment.

The net profits were:

T₁: ₹106.40/bird

T₂: ₹109.62/bird

T₃: ₹124.56/bird

T₄: ₹114.72/bird

Thus, T₃ recorded the highest net profit.

Compared with the control group, supplementation at 0.5% increased net profit by ₹18.16 per bird.

Although T₃ incurred an additional production cost of ₹7.64/bird compared with T₁, its gross return was ₹25.80/bird higher. Consequently, the additional return exceeded the additional production expenditure and resulted in the highest net profit.

These findings are in agreement with Mohanty *et al.* (2020) [5], who evaluated the effect of dietary peppermint powder supplementation in broiler chickens using four treatment groups, namely T₁ (basal diet without peppermint), T₂ (basal diet + 0.1% peppermint powder), T₃ (basal diet + 0.3% peppermint powder) and T₄ (basal diet + 0.5% peppermint powder). They observed that the total production cost increased from Rs. 171.33 in the control group (T₁) to Rs. 181.76 in the 0.5% peppermint powder group (T₄) due to the additional cost of peppermint supplementation. Nevertheless, the improved body weight and feed efficiency resulted in higher profitability, and birds fed 0.5% peppermint powder (T₄) recorded the highest net profit (Rs. 19.51 per bird) among all.

Similar observations were reported by Abdel-Wareth *et al.* (2019) [1], who investigated peppermint leaves at 0, 5, 10 and 15 g/kg diet. Their economic analysis showed that dietary peppermint significantly improved net return and total benefit per group compared with the control treatment.

4. Conclusion

Under the conditions of the present experiment, supplementation of peppermint (*Mentha piperita* L.) leaves powder at 0.5% resulted in the most favourable overall response in Sonali poultry birds. T₃ recorded the highest final body weight, highest gross return, highest net profit and highest B:C ratio.

5. Acknowledgement

I am thankful to the Head of the Animal husbandry and Dairy Science section, College of Agriculture, Nagpur for providing all the necessary facilities for conducting the research work.

Conflict of Interest

Not available

Financial Support

Not available

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How to Cite This Article

Barmade SN, Wankhade BR, Motghare AB, Undratwad DT, Patond MN. Economic evaluation of peppermint (*Mentha piperita* L.) leaves powder supplementation in Sonali poultry birds. *International Journal of Veterinary Sciences and Animal Husbandry*. 2026;11(8):170-172.

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